

# Ants and Cockroaches Trapped Outside Suburban Houses in the Area of Raleigh, Wake County, North Carolina<sup>1</sup>

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*ABSTRACT.*— Ants and cockroaches were collected from pitfall traps placed close to houses. The traps were unbaited or were baited with either boiled raisins or bread. Baited traps collected more ants and cockroaches than unbaited ones. More ants were taken with raisins and more cockroaches were taken with bread. Significant differences were not recorded in relation to ground cover or direction of trap position. Of the 26 ant species trapped, *Pheidole dentata* and *Camponotus americanus* were the most frequently caught. *Parcoblatta uhleriana* was the cockroach species most commonly trapped.

Insects present near suburban houses have received little research attention. More attention has been given to those species found inside houses and other buildings because of their visibility and pest potential to inhabitants. Ebeling (1978) and Mallis (1982) discussed some of the ant and cockroach species found near buildings. One of the most comprehensive literature surveys on the ecology of these and other insects in the urban outdoor environment was by Frankie and Ehler (1978). A public-opinion survey of the principal outdoor pest problems for upper and lower middle-income families was made by Frankie and Levensen (1978). Also, studies have been made of the occurrence and/or the ecology of specific groups or species of crawling insects present at ground level in the urban or suburban outdoor environment. Examples

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are wood cockroaches (Hebard 1917, Beatson and Dripps 1972), the smokybrown cockroach (Fleet and Frankie 1974, Fleet et al. 1978), peridomestic cockroaches (Brenner 1988, Brenner and Patterson 1988, Hagenbuch et al. 1988, Patterson and Koehler 1989), and ants (Wesson and Wesson 1940, Gaspar and Thirion 1978, Kondoh 1978, Pisarski and Czechowski 1978, Vepsäläinen and Wuorenrinne 1978, Nuhn and Wright 1979, Kondoh and Kitazawa 1984, Majer and Brown 1986, Richter et al. 1986, Wuorenrinne 1989, Knight and Rust 1990). Various pitfall traps, such as those designed by Greenslade (1964), Nuhn and Wright (1979), Reeves (1980), and Porter and Savignano (1990), are commonly used to survey crawling insects and their relatives found at the soil level. We present information here on ants and cockroaches that were captured in soil-level pitfall traps placed adjacent to private dwellings in a suburban environment while conducting a study on the efficacy of selected insecticides in band applications around the exterior of houses (Wright and Dupree 1984).

#### MATERIALS AND METHODS

Owners of 35 single-family dwellings in Wake Co., N.C., agreed to participate in the survey. There was no pest control being done outside these dwellings according to the owners, and no earlier pest control attempts were reported. Each agreed to trap placement and retrieval from around their homes five times during an 8-week period. Traps made from 480-ml, round cardboard containers (8.6 cm wide x 9.5 cm deep) were placed in a row of three, 2.5 cm apart, against each of the four sides of the house, unless that placement was prevented by structural barriers. The containers were buried in the ground with the lip at the soil line. A mixture of petroleum jelly and mineral oil (1:1) was applied as a narrow band inside the lip of the container to prevent escape of animals that had entered.

By random selection each of the three traps per house side was baited with 1/4 slice of white bread or with one tablespoon of boiled raisins or was left unbaited. Ground cover around the traps was assigned to one of three categories: (1) bare ground, (2) mulch (including pine bark, pine needles, and hardwood leaves), or (3) ivy cover with or without mulch. A piece of 12-mm hardware cloth (30.5 x 61 cm) was placed over all three traps and fastened to the soil with a 25-cm spike in each corner, to prevent squirrels and other small animals from removing the cloth and taking the baits from the traps. Traps were placed, left for 24 hours, and removed; trapped specimens were put in 70% ethyl alcohol or pinned. An initial trapping was done prior to application of an insecticide during the week of 15-27 July, and additional trappings were

Table 1. Mean numbers of insects collected near houses during the initial trapping period with baited and unbaited traps.

Bait	Insect category <sup>a</sup>		
	Ants	Cockroaches	All insects except Collembola <sup>b</sup>
Boiled raisins	12.34a	0.19a	13.61a
Bread	2.55b	0.67b	5.12b
Unbaited	0.50c	0.02c	1.34c

<sup>a</sup>Mean number of specimens per trap. Numbers followed by different letters within a column are significantly different ( $P < 0.01$ ).

<sup>b</sup>Collembola are excluded because of the large number of specimens that were often present in the traps, especially following periods of rain.

done 1, 2, 4, and 8 weeks after insecticide application. Ants and cockroaches were identified to species.

Data were analyzed using a general linear models procedure with a one-way analysis of variance and unequal numbers of replications.

## RESULTS AND DISCUSSION

A wide range of molluscs and arthropods were taken from a total of 1,969 trap collections. Five classes of arthropods (Arachnida, Chilopoda, Crustacea, Diplopoda, and Insecta) and 14 orders of insects were represented.

Data for the 420 traps used during the initial trapping period indicated significant ( $P = 0.01$ ) differences in bait preferences for the trapped insects (Table 1). Ants preferred boiled raisins over bread, while cockroaches selected bread over boiled raisins. Unbaited traps took the fewest specimens in all comparisons. All insects combined (omitting Collembola) preferred boiled raisins over bread. Data for later trapping periods were not analyzed for bait preferences. Owing to a high standard error, no differences were discernible in the number of specimens relative to ground-cover type or trap placement by direction (N,E,S,W) from the dwellings.

Ants were the most frequently trapped group of insects; that also was reported by Cockfield and Potter (1984), who found them to be the most common predatory arthropods. There were 7,331 ants trapped, representing 26 species in 15 genera (Table 2). The five species most widely distributed and collected in the greatest number of traps were *Camponotus americanus* Mayr, *Formica subsericia* Say, *Paratrechina faisonensis* (Forel), *Pheidole dentata* Mayr, and *Prenolepis imparis* (Say); *C. americanus* and *P. dentata* were the most common of these

species. *Prenolepsis imparis* was by far the most common species in September, when it replaced dwindling numbers of the other species at the onset of cool weather. It was collected infrequently in July and August. Other ant species might have been captured if other baits or collecting techniques had been used. Nuhn and Wright (1979) collected 36 species in 21 genera on the North Carolina State University campus by using several ant-collecting techniques.

The number of ants taken in a trap may be determined by several factors, such as size of nest, number of nearby nests, or recruitment. A relatively less common species may recruit large numbers of individuals to a trap if they happen to nest near the trap, which was probably the cause of the large samples of *Monomorium minimum* (Buckley), *Tetramorium caespitum* (L.), and *Lasius alienus* (Förster). Other species may have been more common and were collected in more traps, but were underrepresented in total numbers collected because they do not recruit as often or in such large numbers.

Pisarski and Czechowski (1978) and Kondoh (1978) in Poland and Japan, respectively, reported that one or two dominant ant species occurred in urbanized areas and a relatively small number of species were present. Pisarski and Czechowski (1978) found tremendous numbers of the dominant species. Porter and Savignano (1990) observed that invading *Solenopsis invicta* Buren decimated the indigenous ant populations in urban and agricultural areas in Texas, with species richness dropping 70%. The total number of native individuals dropped by 90%, concurrent with a large increase in *S. invicta*. Knight and Rust (1990) identified ant specimens collected in and around structures by professional pest control personnel in California. They found more than 25 ant taxa, of which *Iridomyrmex humilis* (Mayr) was the most common species. In Western Australia, some ant species favored urban areas; they were present in urban gardens and absent or uncommon in adjacent native vegetation (Majer and Brown 1986). Other species were present in the native vegetation and absent in the gardens. In contrast, we found no single species to be clearly dominant around structures, except for *P. imparis* in September, probably because of the relatively greater habitat diversity of the more suburban collecting sites.

Cockroach nymphs collected in the traps were not identified to species. Other than native wood cockroaches (*Cariblatta*, *Ischnoptera*, and *Parcoblatta* spp.), the order Dictyoptera was represented by *Blatta orientalis* L. (2 specimens) and *Periplaneta fuliginosa* (Serville) (9 specimens), two species that often occur both inside and outside buildings (Mallis 1982). *Periplaneta fuliginosa* occurs both indoors and outdoors in many southern states and is spreading to areas where it previously was not found (Mallis 1982). Wright (unpublished data)

Table 2. Total ants collected from all traps placed around the outside perimeter of houses in Wake Co., N.C.

Species	Number of traps with ants	Number trapped
<i>Aphaenogaster fulva</i> Roger	4	5
<i>A. lamellidens</i> Mayr	8	65
<i>A. texana-rudis</i> species complex	13	27
<i>A. treatae</i> Forel	15	129
<i>Camponotus americanus</i> Mayr	70	413
<i>C. ferruginea</i> (F.)	20	216
<i>C. nearcticus</i> Emery	1	1
<i>C. pennsylvanicus</i> (De Geer)	14	59
<i>Crematogaster ashmeadi</i> Mayr	4	4
<i>Formica pallidefulva</i> species group	6	9
<i>F. subsericia</i> Say	35	53
<i>Lasius alienus</i> (Förster)	8	210
<i>Leptothorax curvispinosus</i> Mayr	1	1
<i>L. schauimi</i> Roger	1	1
<i>Monomorium minimum</i> (Buckley)	10	461
<i>Myrmica punctiventris</i> Roger	1	1
<i>Paratrechina faisonensis</i> Forel	43	387
<i>P. parvula</i> Mayr	5	5
<i>Pheidole bicarinata vinelandica</i> Forel	4	4
<i>P. dentata</i> Mayr	115	1,122
<i>P. tysoni</i> Forel	4	8
<i>Ponera pennsylvanica</i> Buckley	1	2
<i>Prenolepis imparis</i> Say	54	3,889
<i>Solenopsis</i> sp.	1	1
<i>Tapinoma sessile</i> Say	5	13
<i>Tetramorium caespitum</i> (L.)	3	245

found that *P. fuliginosa* has become an important pest in buildings in several areas of North Carolina since first being identified in 1964, as a result of its continuing spread into previously uninfested areas. Around Florida suburban houses, Brenner (1988), Brenner and Patterson (1988), and Patterson and Koehler (1989) trapped *P. fuliginosa* most often and *Eurycotis floridana* (Walker) second. *Blatta orientalis*, the other non-wood cockroach trapped, was considered an indoor-outdoor species by Mallis (1982). Beatson and Dripps (1972) reported on three long-term infestations of *B. orientalis*, stating that it was usually considered an indoor species in Great Britain. However, its importance as a domestic, indoor species in Raleigh and North Carolina seems to be diminishing (personal observations by the senior author and communications with various pest control company personnel). The reason for its apparent decrease is unknown.

Identified wood cockroach species with the number trapped in parentheses are *Ischnoptera deropeltiformis* (Brunner) (1), *Parcoblatta bolliana* (Saussure and Zehnter) (4), *P. fulvescens* (Saussure and Zehnter) (25), *P. lata* (Brunner) (3), *P. pennsylvanica* (DeGeer) (10), *P. uhleriana* (Saussure) (113), *P. virginica* (Brunner) (15), and *Cariblatta lutea lutea* (Saussure and Zehnter) (1). Hagenbuch et al. (1988) trapped *Eurocytis floridana* most frequently and *C. lutea lutea* second, during a survey of species around Florida suburban homes.

All of the wood cockroaches trapped in our study have been previously reported in North Carolina (Hebard 1917, Brimley 1938); however, this is the first survey that documents their occurrence near North Carolina houses.

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